

## **Applications of XRF and XRD for the Characterization of Coal Fly Ash for Use in Construction Products**

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Coal fly ash (CFA) is the finely divided residue that results from the combustion of pulverized coal in electric generating stations. CFA is pozzolanic in nature as it is composed of predominantly amorphous aluminosiliceous or calcium aluminosiliceous material and thus is widely used as a supplementary cementitious material (SCM) in cement, concrete, and masonry units. CFA reacts with portland cement to generate additional reaction products that improve the durability of concrete and masonry units. Automated X-ray fluorescence (XRF) analysis is a widely-used technique for determining the content of major elements (Si, Al, Fe, Ca, Na, K, Mg, and Ti) and trace elements (Ba, Mn, V, Co, Zn, Sr, As and Rb) in CFA. On the other hand, X-ray diffraction (XRD) technique is used to identify the crystalline phases present in CFA as well as the amount of amorphous material. Typical crystalline phases found in CFA are quartz and mullite. Its pozzolanic nature is attributed to a combination of its chemical composition and its amorphous content which makes XRF and XRD analysis essential tools for characterizing this material.

This presentation provides an overview of this application and case studies where these techniques are particularly useful.